

F3052 - 40

PRICE SCHEDULE

1	2-4	5-9	10-24	25.49	50-99	100-499
\$575.00	\$500.00	\$450.00	\$425.00	\$400.00	\$375.00	\$355.00

Terms: F.O.B. New York, N.Y. 1%-10 Net 30 (Prices are subject to change without notice)

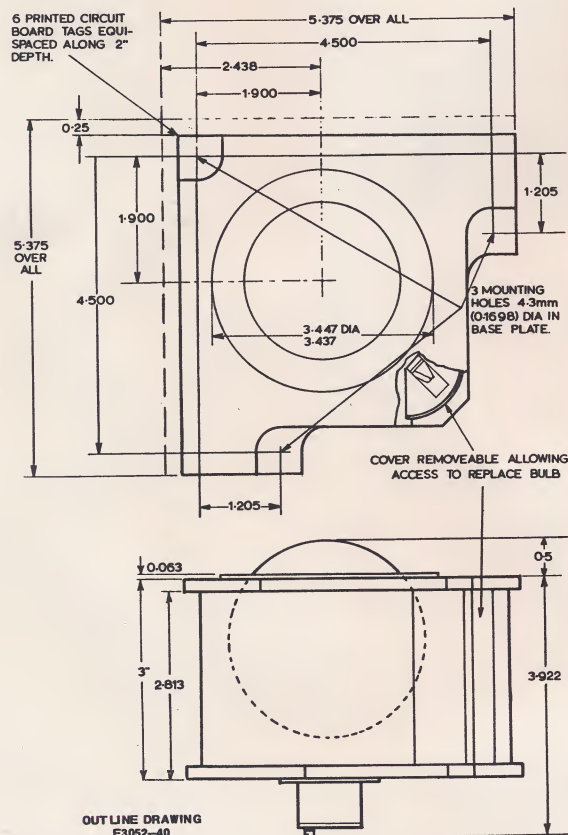
EFFECTIVE AUGUST 15, 1970



MECHANICAL SPECIFICATION

F3052-40	
Materials	
Body	Anodised extrusion
Shafts	Stainless steel
Other metal fittings	Non-ferrous
Ball	Yellow phenolic resin
Finger depression	Acrylic sheeting
Printed circuit boards	Fibre glass
Bearings in exposed positions	Screened
Weight	3.75 lbs.
Ball diameter (nominal)	3 in.
Protrusion of ball above face plate (nominal)	0.625 in.
Dimensions (max.)	5.125x5.125x4.5 in.
Depth under face plate (max.)	3.625 in.
Ball/shaft diameter ratio	10.8
Segments on digitizer disc	48
Vibration	Mil. Std. 810 (method 514 procedure 10 and 11)
Shock	15G non-operating
No ball surface/bearing deterioration after 2,000,000 rotations. Random rotation with sudden shock from rubber plunger-no deterioration after 1,500,000 operations.	

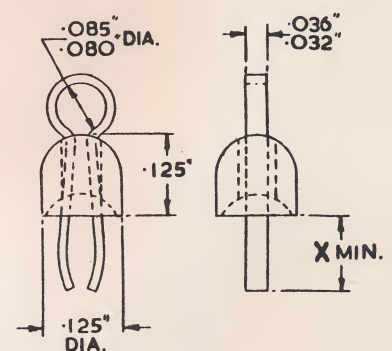
MOUNTING – The tracker ball is normally mounted on a desk panel by means of three pillars 2.813 in. long by .313 in. diameter screwed between the mounting panel and baseplate. Alternatively the pillars may be joined to the mounting panel by projection welding.



Mounting holes equispaced on 5.375 inch P.C.D. centered on ball (± 0.008)

Overall Dimensions are to tolerance $\pm 1/64$ th inch (± 0.015)

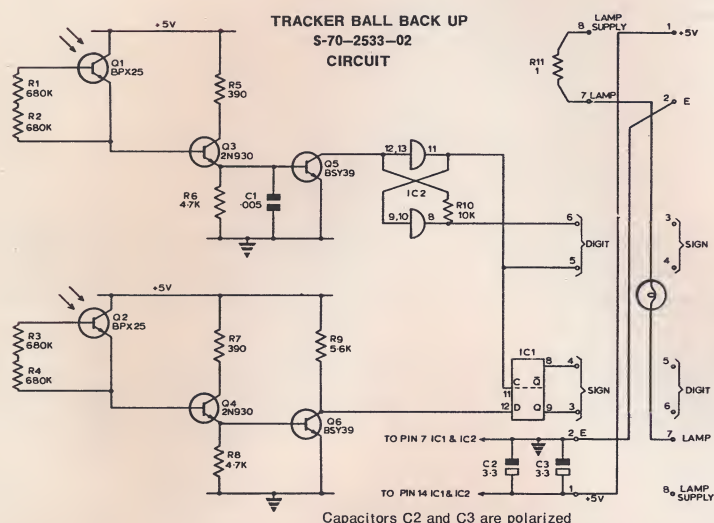
Each circuit board contains 8 terminal pins



TERMINAL PIN

ELECTRICAL SPECIFICATION

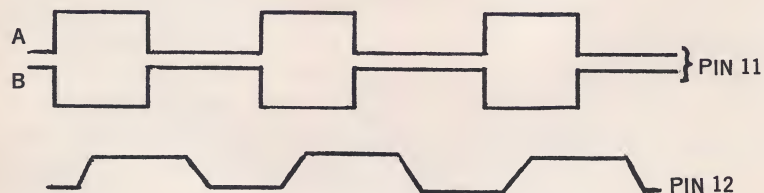
Logic	SN 5400J series military ceramic logic
Supply Voltage	Lamp 5V d.c. $\pm 10\%$
Circuit	5V d.c. $\pm 10\%$
Total circuit current excluding lamp.	100mA
Lamp current (at 5V)	500mA (max)
Output pulses	512(min) per ball revolution
Outputs. Pins 5 and 6	Digit and $\overline{\text{digit}}$
Pins 3 and 4	Sign and $\overline{\text{sign}}$
Output Levels	TTL
Output Drive Capability	Pin 5 8 loads Pin 6 9 loads Pin 3 & 4 10 loads each
Operating temperature	-10°C to +55°C
Storage temperature	-20°C to +70°C
Relative humidity	99% max
Festoon lamp	6V 3W PC 48602 Ref. No. 1 J.S. Cat. No. 6240-99-995-1239
Failure rate	12.5×10^{-6} per hour



EDN	DIFFERENCES PER EDITION	
	IC1	IC2
02	SN5474J	SN5400J

MILITARY CERAMIC

CIRCUIT DESCRIPTION – Two boards as above are provided (one for each axis) but in situ one is inverted. The output from Q5 is fed to IC2, a Schmitt trigger, which squares up the digit output. The output from Q6 is fed to IC1, a type D bistable. The input waveforms at pins 11 and 12 of IC1 are as shown according to the direction of rotation.



IC1 triggers on a positive leading edge at pin 11. The logic level at pin 9 of IC1 will therefore be '0' when the positive leading edge of waveform A is present at pin 11 and 1 when the positive leading edge of waveform B is present. Each board has a dropping resistor, R11. These are wired together in series with the lamp supply to ensure maximum lamp life. The digit output is a train of pulses, the rise time and duration of each pulse depending on the rate of rotation of the ball. The sign output depends upon the direction of rotation of the ball. When ball direction is reversed the sign voltage changes at the same time as the next digit pulse. The sign for clock wise rotation is PIN 4=0 PIN 3=1

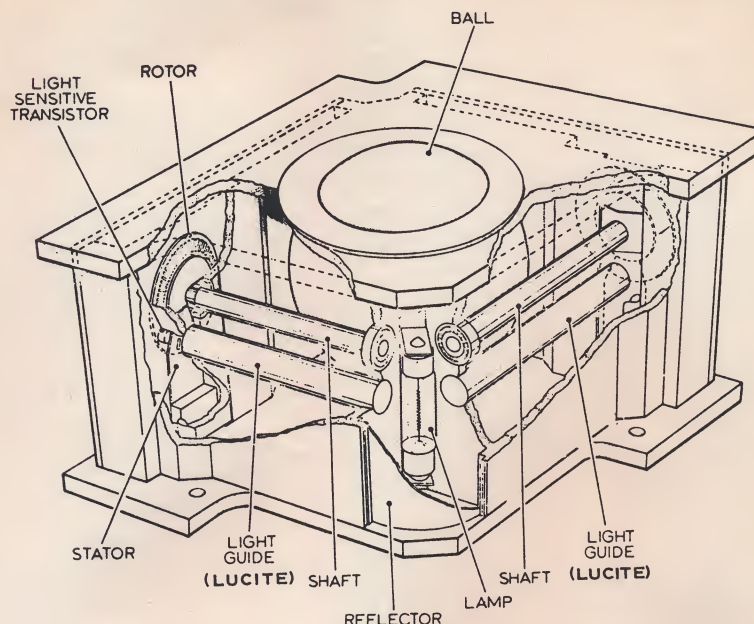


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TWX No. 710-581-4088 Cable: Calvertron, N. Y.

PRICE SCHEDULE TB-11
DATA SHEET
EFFECTIVE 8-15-70
Replaces TB-10 Dated 6-15-70

F3052-40

OPTICAL ENCODER TRACKER BALL



DESCRIPTION: The Tracker Ball Controller, with its low torque and effortless operation, can be used for longer periods in any situation requiring precise positional control, without operator fatigue. It can be used to control the position of synthetic markers on displays such as Radar P.P.I. and is normally mounted on a desk panel immediately below the display tube.

The controller is ideal for use with graphical displays associated with digital computers such as are used in the computer aided design of integrated circuit masks. The digital output enables positional information to be fed directly to the computer. The direction of movement of the marker on the display is directly related to the direction of rotation of the ball.

The assembly consists of a ball protruding above the face plate of a light alloy housing. It is held firmly against two take-off shafts by a spring-loaded ball race. The two shafts are accurately positioned at 90° to one another and each has a slotted disc fastened to one end. These discs respond to X or Y ball movement.

Light is channelled to the X and Y discs where it passes through slots and falls on corresponding phototransistors. The number of times the light to the phototransistors is interrupted, i.e. the number of 'pulses', in the output, is controlled by the amount of ball movement. (512 pulses per ball revolution).

DESIGN FEATURES:

RELIABILITY

- Not affected electrically or mechanically by spilled liquids, tea, coffee, etc.
- ● Drain hole provided for liquids that enter the controller.
- Tracker Ball compartment separated from optical encoders.
- Greater than 80 years life expectancy for mechanism with 10% duty factor.

PERFORMANCE:

- Less than 2 oz. in. torque required to obtain pulse in any direction.
- Operates to full specification over ambient temperature range- 10° C to +55° C with up to 90% humidity.
- No routine maintenance or lubrication required
- Is not affected by r.f. or magnetic interference.

- Screened bearings in all exposed positions.
- No adjustment required during lifetime of controller.
- Single lamp provides illumination, by means of light guides, for four phototransistors.
- No tools required to replace lamp.
- Greater than 10 years life expectancy for optic encoder lamp.

- No r.f. interference generated.
- No gradual deterioration in performance such as jitter or reversal of direction.
- Single lamp light source can be replaced in ten seconds.
- Close tolerance registration, (.005 in.), printed boards for fast replacement